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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,857	04/05/2004	Kazuhiro Wakao	118644	1832

25944 7590 11/14/2007

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EXAMINER	
BHAT, NINA NMN	

ART UNIT	PAPER NUMBER
1797	

MAIL DATE	DELIVERY MODE
11/14/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/816,857	WAKAO ET AL.	
	Examiner	Art Unit	
	N. Bhat	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2,4-9,11,18,20,22-27 and 36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2,4-9,11,18,20,22-27 and 36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 30, 3007 has been entered.

2. Action on the merits of claims 2, 4-9, 11, 18, 20, 22-27 and 36 are pending in this application. Applicant's amendments have obviated the 112, second paragraph rejections made in the office action of March 30, 2007.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 2, 4-9, 11, 18, 20, 22-27 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kawasumi US Patent 6,641,944 in combination with Tetsuo, JP 2000-268840 and Naka et al PG PUB 2002/0187890.

Kawasumi teaches the invention substantially as claimed. Kawasumi teaches a reforming catalyst degradation determining apparatus which determines whether a reforming catalyst that reforms a mixture of air and fuel is degraded accomplished by measuring the temperature using a sensor (71) that detects the temperature of the reforming catalyst and determining whether the reforming catalyst is degraded based on the temperature of the reforming catalyst (51, 52). Specifically Kawasumi teaches that the deterioration of the catalyst is determined by detecting the outlet temperature of catalyst 51, 52 but also be determined by other methods by detecting one or more temperatures, carbon monoxide concentration, methanol concentration, hydrogen concentration, carbon dioxide concentration, water concentration and gas flowrate, the deterioration of the catalyst ids determined based on the detection, and further there is a clear teaching in Kawasumi that when the hydrogen concentration decreases over time or the flowrate decreases as shown in Figure 6, the catalyst has deteriorated. Kawasumi further teach that a ratio of the catalyst inlet temperature and outlet temperature is monitored, data collection takes place and stored by computer and the ratio is used to determine whether the catalyst needs to be replaced. Kawasumi further teaches that deterioration can also be determined by estimating the reforming rate, by estimating the percentage of methanol reformed to hydrogen when reforming reaction is performed and the reforming rate can simply be found from the relation between the reforming rate, the amount of methanol and water supply which are already known an one or more the hydrogen concentration, carbon dioxide concentration, methanol concentration water concentration or gals flowrate which are measured beforehand. If the gas components are measured and the reforming rate is calculated the deteriorating rate can be set by more factual reforming conditions.[Note Figure 3, Column 3, lines 35-55 and Column 4, lines 11-60]

However, Kawasumi does not teach the rate of increase in the detected temperature rate of increase of the reforming catalyst nor the specific map defining a correlative relationship between the reforming catalyst and the air-fuel mixture.

As stated above, Kawasumi does teach and recognize that there are number of methods which can be used to determined whether reforming catalyst is degraded and specifically teaches monitoring the temperature at the inlet and outlet of the reforming catalyst, measuring the concentration of hydrogen, carbon monoxide, carbon dioxide, water etc. which can be used in determining whether the catalyst has deteriorated. The rate of increase in temperature has not been specifically addressed however, the rate of reforming and correlations between the reforming rate and catalyst deterioration has been taught.

Tetsuo teaches a reforming catalyst degradation process which measures the temperature of the effluent from the reforming catalyst downstream of the catalyst and by monitoring the temperature of the effluent, adjustments can be made at the inlet. This information which is measured and recorded when reviewed by the ordinary artisan provides whether the catalyst is degraded or not operating at efficient levels.[0060-0062 and 0068]

Naka et al. teach a method of restoring catalytic performance of a reforming catalyst once deterioration or degradation is detected. The method as described by Naka et al. does not require actually removing the catalyst from the reformer but rather rejuvenating the catalyst once deterioration is detected. Naka et al. teach that an apparatus which comprises a measuring device for obtaining information indicating the performance of the catalyst in the reforming catalyst apparatus and a control device for controlling supply amounts of the fuel and air based on the determination with respect to the catalyst performance obtained from information indicating the catalyst performance. Specifically the measuring device which includes a temperature sensor (6) is used to measure a catalyst temperature and the control

device which records and monitors the temperature, controller (7) determines whether the catalyst performance is deteriorated based on the catalyst temperature obtained by the measuring device. Also taught by Naka uses a gas sensor (19) which measure the composition of the reformed gas formed by reforming catalyst and a control device which determines whether the catalyst performance is deteriorated based on the composition.[Note paragraphs [0012]-[0014]. Naka teaches that when it is determined that the catalyst has been deteriorated the control device controls supply amounts of the fuel and air at a particular temperature and time to improve the performance of the catalyst. Naka et al. teach in Figures 4-5, a graph which shows the time dependent changes of the reforming rate and the catalyst temperature during the reforming operation based on the particular catalyst used , the correlation is shown in an equation bridging Paragraphs [0050] and [0051], the equation teaches that there is a correlation of temperature rise of the reforming catalyst and degradation of the catalyst performance. such that it is possible to determine that the catalyst performance is lowered such that the reforming catalyst cannot be used more when a temperature of a reforming catalyst (2) reaches a predetermined temperature. Naka et al. teach that the temperature rise of the reforming catalyst occurs when the catalyst is degrading/deteriorating and when the reforming catalyst deteriorates, the reaction rate of reforming is reduced. The predetermined temperature for determining the degradation of the reforming catalyst is determined without limitation and depends on the reforming catalyst and the performance required for the reforming catalyst device. With respect to applicant's specific limitation regarding a map defining a correlative relationship between the reforming catalyst and the air-fuel ratio which is stored in a storage device of the electronic control unit, this would be inherent if not obvious to one having ordinary skill in the art, as most controllers are linked with a computer or a storage device which is capable of being operated as claimed by applicant. It is the position of the examiner that even

though the computer or storage device is not specifically described this would be implicitly implied when temperatures, concentrations and sensors are being used within a system in or to monitor the degradation of a reforming catalyst and process.

It is maintained that from the combined teachings of Kawasumi, Tetsu and Naka et al. specifically teaches suggests an apparatus and process which determines whether a reforming catalyst is degraded which includes temperature sensing that detects a temperature of the reforming catalyst, an electronic control unit which is equivalent to a (a controller or controlled with a computer) which is capable of determining the temperature of the reforming catalyst after mixture of air and fuel is introduced into the reforming catalyst, the teaching regarding rates has been specifically taught in Kawasumi and Naka as described above. Tetsu teaches that the prior art recognizes and teaches that temperature sensing of the catalyst is known and that manipulating the steam once a difference in temperature is detected has been taught and suggested by the prior art. As applied above, Naka does teach and suggest correlations between the extent of degradation of the catalyst and the detected temperature which has been argued by applicant and noted by the examiner. It is maintained that the when reading the teachings of Kawasumi, Tetsu and Naka et al. applicant's invention is rendered obvious to one having ordinary skill in the art at the time the invention was made.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. WO 01/00524 described a process for the reservation of reforming catalysts by adjusting the temperature of the catalyst, the air, steam or fuel feed rate. JP 11-79702 teach a modification method used when methanol is reformed into hydrogen.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Bhat whose telephone number is 571-272-1397. The examiner can normally be reached on Monday-Friday, 9:30AM-6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

N. Bhat
Primary Examiner
Art Unit 1797